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EFFECT OF REHYDRATION RATIO AND REHYDRATION COEFFICIENT ON OSMOTIC DEHYDRETED PAPAYA SLICES

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ABSTRACT

Papaya is a good source of beta-carotene, which helps to prevent damage by free radical, which may otherwise lead to some forms of cancer. It has more carotene compared to other fruits such as apples and guavas. Carotene in food is converted into vitamin A in people's body. Papaya is a low calorie fruit compared to others. 100 grams of ripe papaya contains only 32 kcal. The comparative low calories content make this a favourite fruit of obese people who are into weight reducing regime. Papain also exhibits pain relieving properties and the United States Food and Drug Administration has approved its medicinal use to ease the discomfort of slipped discs. This is used for injection into herniated inter vertebral lumbar discs to relieve pain caused by the pressure on nerves. To find out from osmotic dehydrated papaya slices rehydration ration and coefficient of rehydration.

The present study concluded that, the rehydration ratio decreases with increase in sugar syrup concentration and drying temperature. The higher values of rehydration ratio are observed at 50^0C drying temperature. Higher rehydration coefficient is obtained for the osmotically dehydrated samples at lower concentration and lower drying temperature. The moisture content of rehydrated samples has shown higher values at a particular concentration, for different drying air temperatures.

KEYWORDS: Papaya, Temperature, Rehydration Ratio, Coefficient of Rehydration

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Original Article

INTRODUCTION

Papaya is a good source of beta-carotene, (Machewad *et al.,* 2003), which helps to prevent damage by free radical, which may otherwise lead to some forms of cancer. It has more carotene, compared to other fruits such as apples and guavas. Carotene in food is converted into vitamin A in people's body. Papaya is a low calorie fruit compared to others. 100 grams of ripe papaya contains only 32 kcal. The comparative low calories content make this a favorite fruit of obese people who are into weight reducing regime. This low calorie, nutritive and low in cost fruit is the best dietary supplement for a healthy life. It will be more convenient if papaya fruit is processed as drinks that can be included in our regular daily meals. The characteristics of papaya such as the aroma, flavour, color, nutrient content and enzymatic concentration are expected to be retained for a high quality dehydrated papaya throughout this research. Papaya is rich in precursors of vitamin A, vitamin C, vitamin B Complex, folates, minerals and fiber. It is also rich in antioxidants, low in sodium and calories, high in potassium and no cholesterol.

Papain also exhibits pain relieving properties and the United States Food and Drug Administration has approved its medicinal use to ease the discomfort of slipped discs. This is used for injection into herniated inter vertebral lumbar discs to relieve pain caused by the pressure on nerves. Papaya (Graziella *et al*., 2004) when

consumed regularly will ensure a good supply of vitamin A and C. It also contains vitamins B, D, E, K and C, and minerals such as Magnesium, Sodium, Iron, Calcium, Phosphorus and Potassium. Being rich in vitamin A and C, papaya has been used to heal ulcers and other internal bleeding. Healing speeds up with pieces of papaya laid on wounds and surgical incision. To find out from osmotic dehydrated papaya slices rehydration ration and coefficient of rehydration.

Osmotic dehydration has received greater attention in recent years as an effective method for preservation (Konopacka *et al.,* 2009) of fruits and vegetables. Being a simple process, it facilitates processing of fruits and vegetables such as banana, sapota, fig, guava, pineapple, apple mango, grapes, carrots, pumpkins, etc. with retention of initial fruit characteristics viz., color, aroma, texture and nutritional composition. It is less energy intensive than air or vacuum drying process because, it can be conducted at low or ambient temperature.

The present study was conducted with an objective, to assess quality characteristics like rehydration ratio and rehydration coefficient of papaya slices, in Agricultural Process & Food Engineering Laboratory at College of Agricultural Engineering, Bapatla.

MATERIAL AND METHODS

Tray dryer was used for osmotic dehydration of papaya slices. The osmotically dehydrated papaya is kept in cleaned aluminum trays. These trays were kept in tray dryer for drying. Papaya pieces were dried at different temperatures of 50^0C, 60^0C, and 70^0C. Constant air circulation rate of 1.5 m/s was maintained during drying. The drying was performed continuously for 12h, 10h and 8h respectively, until the material was dried to approximately below 10% of moisture content. The dried samples were taken out from the tray and cooled, packed and stored for quality analysis.

Dehydrated papaya samples of different formulations were evaluated for the following parameters

Rehydration Ratio and Coefficient of Rehydration

Samples were tested for different parameters like color, taste, texture, aroma and overall acceptability. This test for consumer acceptance was done by sensory panelists according to 9 point hedonic scale for sensory evaluation as described by (Peryam and Giradot, 1952) and, as per the sensory evaluation score card.

Rehydration Ratio

Rehydration ratio of dehydrated product was determined by rehydration test. The dehydrated samples of 5g each were placed in a glass beakers, 100ml of water was added and heated at 40-45^0C for 60 min. The excess water was drained off through blotting paper. The drained samples were weighed. Rehydration ratio (RR) and moisture content (MC) in the dehydrated samples were computed using following equation: (Srivastava & Sanjeev Kumar: Fruit & Vegetable preservation: Principle and Practices, 3rd edition, 2012)

Rehydration Ratio= c/d

Where, c = drained weight of rehydrated samples, g

d= weight of dehydrated samples taken for rehydration test, g

Coefficient of Rehydration

The coefficient of rehydration was calculated by the formula: (Srivastava & Sanjeev Kumar: Fruit & Vegetable

preservation: Principle and Practices, 3rd edition, 2012)

Rehydration Coefficient

$$\frac{\text{Drained wt. of rehydrated material} - \text{dry matter content in the sample taken for rehydration}}{\text{Drained weight of rehydrated material}} \text{ X } 100$$

Percent Water in the Rehydrated Material

The drained weight of the rehydrated sample being known the percent water content in the rehydrated material is calculated by (Srivastava & Sanjeev Kumar: Fruit & Vegetable preservation: Principle and Practices, 3rd edition, 2012)

$$\frac{\text{Drained wt. of rehydrated material} - \text{dry matter content in the sample taken for rehydration}}{\text{Drained weight of rehydrated material}} \text{ X } 100$$

RESULTS AND DISCUSSIONS

The observed values of different osmo-air solution concentrations on the water loss, solute gain, weight reduction, sensory score and quality characteristics of papaya slices have been studied. The osmotic dehydration process of papaya slices is optimized by using syrup solution to give a maximum water loss, weight reduction, sensory evaluation score and minimum solute gain. The pretreated papaya slices were subjected to different drying temperatures with different syrup concentrations and analysis of data.

The value of rehydration ratio, sensory evolution score and chemical analysis of dehydrated papaya slices were observed at different temperatures at different osmotic concentrations are shown in the Table 1. And Table 2.

Table 1: Observed Values of Different Attributes after Osmotic Dehydration of Papaya Slices

S. No.	Particulars	50^0c			60^0c			70^0c		
		30^0B	40^0B	50^0B	30^0B	40^0B	50^0B	30^0B	40^0B	50^0B
1	Moisture Content (%)	6.12	5.54	4.9	6.64	5.61	4.86	6.76	5.98	4.00
2	Ash Content (g)	0.5	0.54	0.55	0.51	0.55	0.57	0.55	0.58	0.59
3	Vitamin A(mg/100g)	0.53	0.58	0.59	0.56	0.59	0.6	0.57	0.593	0.61
4	Vitamin C(mg/100g)	55	58.35	60.06	51	54.36	58	42	45	48
5	Total Soluble Sugars (%)	12.65	12.5	10.3	12.05	11.8	10.2	11.55	10.75	9.95

Table 2: Observed Values of Different Attributes after Rehydration of Papaya Slices

S. No	Particulars	50^0c			60^0c			70^0c		
		30^0B	40^0B	50^0B	30^0B	40^0B	50^0B	30^0B	40^0B	50^0B
1	Rehydration Ratio	3.95	2.92	2.38	2.48	2.39	2.04	2.27	2.36	2
2	Overall acceptability	7.8	7.6	7.9	7.6	7.9	7.8	7.5	7.8	7

The results of the study conducted to see observed values of osmotic solution concentration on rehydration ratio are reported in (Figure 1.) it is observed that the rehydration ratio decreases with increase in sugar syrup concentration and drying temperature. The higher values of rehydration ratio are observed at 50^0C drying temperature.

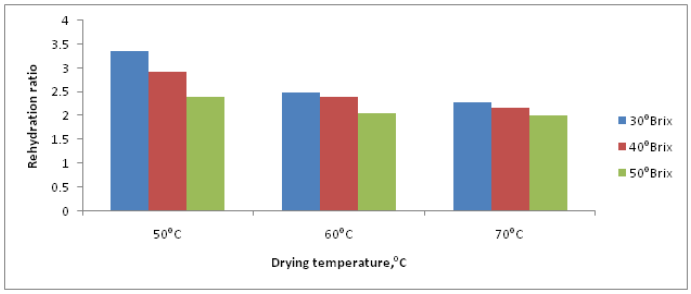

Figure 1: Rehydration Ratio of Samples Osmotically Dehydrated at Different Temperatures and Concentrations

Observed values of rehydration ratio are reported in (Figure 2.). Higher rehydration coefficient is obtained for the osmotically dehydrated samples, at lower concentration and lower drying temperature.

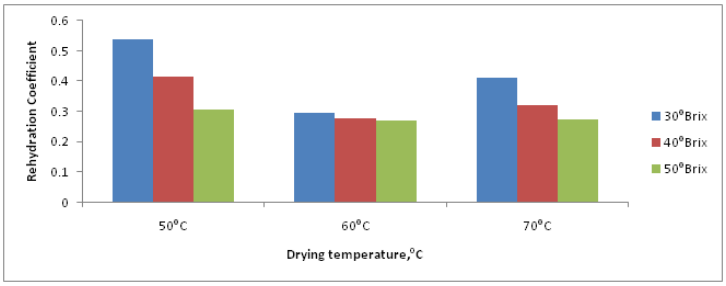

Figure 2: Rehydration Coefficient of Samples Osmotically Dehydrated at Different Temperatures and Concentrations

Observed values of moisture content after rehydration test are given in the (Figure 3.) The moisture content of rehydrated samples has shown higher values at a particular concentration, for different drying air temperatures.

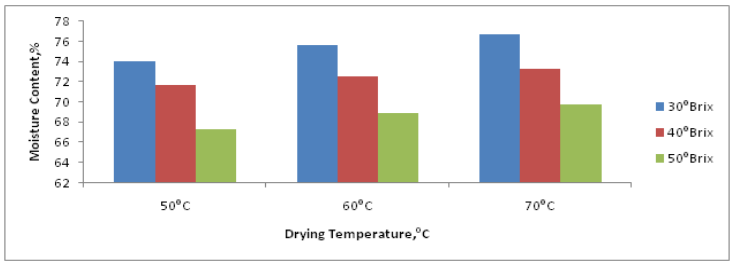

Figure 3: Variation of Moisture Content after Rehydration Test for Osmotically Dehydrated Samples, at Different Temperatures and Concentrations.

CONCLUSIONS

The present study concluded that, the rehydration ratio decreases with increase in sugar syrup concentration and drying temperature. The higher values of rehydration ratio are observed at 50^0C drying temperature. Higher rehydration coefficient is obtained for the osmotically dehydrated samples, at lower concentration and lower drying temperature. The moisture content of rehydrated samples has shown higher values at a particular concentration, for different drying air temperatures.

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